



FreedomCAR and Fuel Partnership

Codes and Standards Tech Team (CSTT)

Overview & Introduction

CSTT Purpose & Operation

C&S Roadmap & Fuel Purity

Brad Smith, Shell Hydrogen – CSTT co-lead

April 26, 2004



Members

FreedomCAR and Fuel Partnership



w/ National Labs

ChevronTexaco

ConocoPhillips

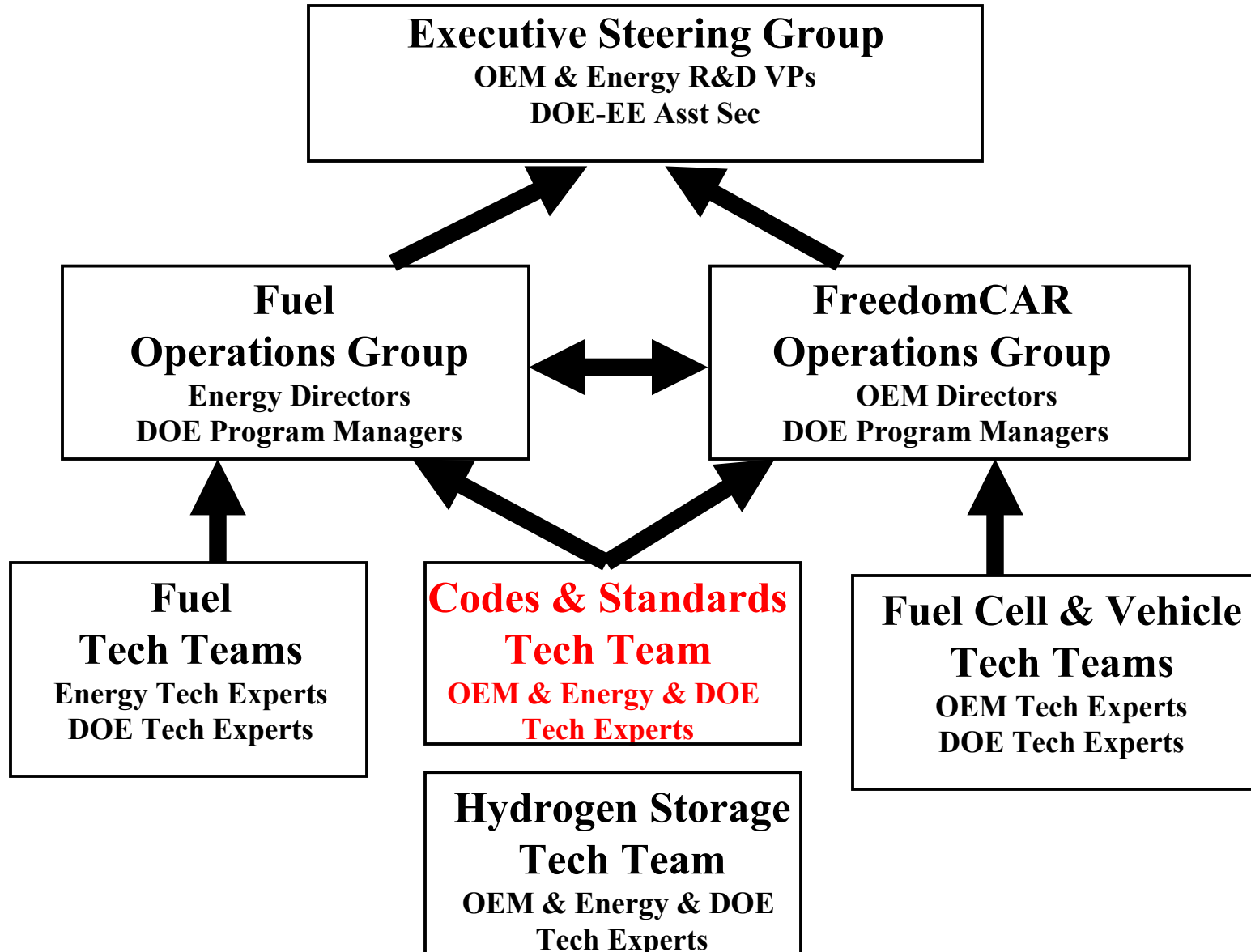
EXXONMobil



DAIMLERCHRYSLER



Organization





Codes & Standards Technical Team

C&S Roadmap

Focus on R&D

Solicit Input

Enable CDO/SDO

Enable Practice/Education

Communicate



CSTT Purpose

C&S Roadmap

- Develop a C&S Roadmap with focus on R&D in areas where sufficient data or experience is not currently available
- Enable the responsible development of robust codes & standards based on factual knowledge including statistically-appropriate experiential data
- CSTT C&S Roadmap will help DOE further develop the annual DOE R&D Plan by identifying priorities and timeframes

Coordinate with needs of CDOs & SDOs

- Seek input from experts and other professional organizations (NHA, USFCC, SAE, etc)
- Coordination of federal R&D at universities & national labs
- Coordination with requirements of promulgation & regulatory processes

Gaps

- Insufficient existing data
- Incorrect or inappropriate data
- Organized dissemination of information
- Education of stakeholders
- Training for industry and governments

Gap Closing Efforts

- Coordinate comprehensive data collection plan (Roadmap)
- Detail certain specific R&D approaches
- Assess existing information and processes currently underway
- Define both hard and soft R&D approaches
- National website access for CDO/SDO



Work Plan Target Areas

- 1. Hydrogen Properties**
- 2. Vehicle Applications**
- 3. Hydrogen Infrastructure Applications**
- 4. Interface Applications**
- 5. Testing/Validation**
- 6. Education/Training**
- 7. Communication/Dissemination**
- 8. Coordinate w/ other TTs**



Context for Industry

- 1. Readiness State**
 - Pre-Commercial**
 - Commercial**
- 2. Classification**
 - Safety : (fire, properties, etc.)**
 - Commercial : (purity, pressure, etc.)**
 - Systems : (station/vehicle interface, etc.)**
- 3. National and Global Awareness**



Hydrogen Fuel Quality: R&D Needs

1. Resolve data deficits

- **Impact of impurities & diluents on fuel cells**
- **Impact of impurities & diluents on production technology**

2. Assess validation / testing possibilities

3. Assess utility and scope of potential interim guidelines (pre-commercial)

4. Include continued R&D within C&S Roadmap to evolve guidelines to a commercial application

5. Cross cut with FC TT, Production TT, and Delivery TT to establish criteria

6. Engage industry, academia, and CDO/SDOs

Draft Purity Plan

DRAFT

2004				2005				2006				2007				2008			
•Q1	•Q2	•Q3	•Q4	•Q1	•Q2	•Q3	•Q4	•Q1	•Q2	•Q3	•Q4	•Q1	•Q2	•Q3	•Q4	•Q1	•Q2	•Q3	•Q4
Develop and Implement Plan of Organizing Information																			
Define Terminology																			
Identify impurities of concern																			
Develop Test Protocol to measure impact of impurities on fuel cells																			
				Update protocol for technology changes															
Identify methods for detection of impurities																			
				Execute Test Protocol for H2 impurities related to Infrastructure (feedstock, production, processing, handling, storage)															
Assess impact of impurities on storage media																			
				Ascertain mechanisms for impact of impurities on fuel cells															
				Assess implications of H2 purity on H2 infrastructure (feedstock, production, processing, handling, storage, cleanup)															
Assess experiences from validation & demonstration projects																			
Coordinate information and analyses with international experts (SDO's and professional groups)																			
Develop and iterate evolving H2 fuel purity guidelines leading to a proposed standard for commercial H2 fuel purity																			

▲ SAE Recommended Practice for hydrogen fuel quality

* USFCC input anticipated



Potential Timeline

2004

- **Draft Technical Roadmap**
- **Identify early participants (nat'l labs, universities)**
- **Develop design of experiments (test protocol)**

2005

- **Implement & oversee experimental test protocol (nat'l labs & universities)**

2006

- **Workshop to evaluate results, select guidelines**
- **Assess experience from programs**

2007

- **Disseminate to SDOs with information & analysis**



Codes & Standards Technical Team

Thank You

from the entire CSTT